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## A NATIVE FIBRE PLANT.

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Whilst on a recent trip to the Rompin District, Pahang, where the only method of travel is by "Jalak," a special kind of native boat peculiar to the Pahang coast, I noticed that the sheet of the mainsail, instead of being made of the usual coir or hemp, consisted of a plaited rope of some fibre unknown to me. On asking the "Captain" of the boat where he had obtained it I was informed that he had made it himself from the fibre of a tree known as "Baru" or "Waru" (*Hibiscus tiliaceus*—Linn). As a jalak is a heavy boat capable of carrying five or six tons of merchandise, and we were occasionally subjected to some fairly heavy squalls I was given an opportunity of forming some idea of the strength of this rope.

On my return I made some enquiries into the habitat and character of the plant, and found that it was extremely plentiful all along the banks of rivers, and even in sheltered places along the coast, the main essential to its existence being a fair amount of salt. Its distribution can accordingly be reckoned as approximately the same as that of the various species of mangrove, though it prefers a firmer soil than those plants. Plenty of water at the roots is however essential, and although it is often to be found growing in apparently sterile sand, there is no doubt that there

is a good supply of brackish water at no great distance from the surface.

The specific name "*tiliaceus*" is appropriate in more ways than one, for not only do the leaves resemble those of the common British lime (*Tilia*), but the fibres obtained from the two trees are very similar. Baru fibre, however, appears to me to be of a rather better quality and considerably stronger. The flowers are canary yellow, in size and shape closely resembling those of the common garden abutilon. The tree grows to a height of about 25 feet, the maximum dimensions being attained in about 10 years I should say, but as the tree does not appear to be cultivated, and is looked upon as more or less of a weed, it is impossible for me to speak definitely on this point.

It is extremely difficult to kill by cutting back, and can be pollarded to almost any extent without apparent injury. In about four years from the date of cutting there should be sufficient strong, healthy shoots for a second profitable pollarding.

The native method of rope-making is as follows:—Straight branches are selected and the bark stripped off. It comes away easily enough from the wood, although a little tapping with a stick or the flat of a parang may be necessary to make it run more easily. This operation often appears to be performed on the standing tree, although for obvious reasons it would be better in every way to cut it right back to near the ground and then strip the bark from the branches. In this way straight shoots would be ensured for the next rotation. After the bark has been stripped off it is spread on the ground to dry for a day or two, after which the inner layer of fibre can easily be separated from the bark, which, in itself, is worthless. No further treatment is considered necessary, and the fibre is simply twisted or plaited into the form of a rope. A specimen was cut, dried, and completed within 48 hours. Although the native made article is of comparatively poor quality it is decidedly strong, and in many respects superior to coir, which frays easily, does not run well through a block, and rapidly deteriorates in water. Baru rope, on the contrary, is said to keep better if not allowed to dry thoroughly.

It is quite possible that this fibre, if treated and cleaned by proper machinery would work up into a far superior article. As will be seen from the above brief description of the native process of manufacture, no attempt is made to clean or sort the fibre, so that many inferior fibres possessing no tensile strength are in-

evitably mixed up with the really good ones. In view of the vast supplies that are running to waste on the river banks, and of the large areas of land incapable of growing anything else of value Baru fibre seems well worthy of investigation.

(According to Dr: Watt *H. tiliaceous* is common on the coasts of India, Burmah, and Ceylon. The same author speaks highly of the quality of the fibre. Samples have been sent to the Imperial Institute for valuation.—Ag: Conservator of Forests, S. S. and F. M. S.)

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## 'STUDIES OF AN ACID SOIL IN ASSAM.'

ABSTRACT.

An important contribution to the problem of liming is contained in a Memoir by A. A. Meggitt, bearing the above title, recently issued by the Department of Agriculture of India. (Vol. III No. 9). It consists of an account of work done on the Government Farm, Jorhat, undertaken to ascertain, if possible, to what particular function of lime its remarkably beneficial action on cropping there may be. It has been found that whereas on the untreated soil certain crops, *e.g.*, oats, gram, barley, mustard, linseed etc. consistently failed to survive the seedling stage, after the application of lime normal crops are afforded.

Analysis shews it to have the following composition:—

| Mechanical Analysis | % | Chemical Analysis | % |
|---|---|---|---|
| Coarse Sand | 7·2 | Loss on ignition | 3·26 |
| Fine Sand | 52·5 | Potash | 0·115 |
| Silt | 22·6 | Phosphoric acid | 0·025 |
| Fine Silt | 5·0 | Lime | 0·154 |
| Clay | 6·6 | Magnesia | 0·166 |
| Moisture and loss on ignition | 5·1 | Nitrogen | 0·114 |
| | | Available Potash | 0·007 |
| | | „ Phosphoric acid | 0·008 |

Acidity expressed as parts quicklime (CaO) required to neutralise one million parts of air-dry soil = 1350 = ·135%.

[Amount of quicklime required to neutralise an acre of soil (3,000,000 lbs.) to 1′ depth = 1·8 tons.]

[The soil is sandier than most soils met with in Malaya, contains more lime and is less acid, but, in other respects, is similar, notably in the deficiency of phosphoric acid.]

Of recent years, according to Meggitt, it has been enormously improved by green manuring with cowpea.

Laboratory examination of the Jorhat soil has disclosed the presence of an acid organic compound which is definitely toxic to certain seedling plants, even in extremely dilute solution, the toxicity of which was negatived by the addition of a complete nutrient solution containing nitric nitrogen, or by the addition of lime to neutrality. The observations thus made in culture solution agree with field results, and render it reasonably clear that the soil's infertility to certain cropping is due in no small part to the presence of toxic organic material.

A point of extreme interest is that this body is not only not toxic to transplanted paddy seedlings, but that it appears actually to favour their development in such concentrations as were definitely toxic to *Andropogon Sorghum*.

[This coincides with observations made in Ceylon and elsewhere that liming paddy fields may be distinctly injurious to the crop, whereas application of neutral lime compounds, such as calcium sulphate appears to be beneficial. The present writer, when examining coconut soils, has encountered several instances in which the acidity of a high yielding field is considerably greater than that of a neighbouring area of lower fertility, from which it seems not improbable that the coconut tree may be analogous to the paddy plant in this respect. On the other hand there is no reason to suppose that *Hevea Brasiliensis* also falls within this category.]

The experimental work described by Meggitt was carried out on 52 small field plots, and the scheme comprised the testing of each individual treatment with and without lime.

Various alkali plots were included, *e.g.*, sodium carbonate, magnesium carbonate and potassium carbonate, to compare with the plot receiving lime only, another getting finely ground limestone. Two plots were given calcium sulphate and chloride respectively, to test the direct plant food theory. The three nitrates of potassium, sodium, and lime were each separately used with a

view to seeing whether the supply of readily assimilable nitrogen alone has any effect on cropping, in the absence of first neutralising part or the whole of the soil acidity. Two further plots received sulphate and chloride of potash respectively, supplying soluble potash in the same amount as provided for in one of the plots manured with carbonate of potash.

The experiment was also designed to show how the use of certain acid or physiologically acid manures in the absence of liming is limited by the small amount of carbonate of lime present in the soil (·02%).

Sulphate of ammonia alone and in combination with other manures enter into the scheme, and again, plots are included whereon acid and basic forms of phosphoric acid are applied. Besides those plots which receive either potash or nitrogen or phosphoric acid only, there will be found other plots manured with both potash (as sulphate) and also nitrogen, either as sodium nitrate or sulphate of ammonia; others getting superphosphate in addition to one or other form of soluble nitrogen; and finally one plot with superphosphate and sulphate of potash in the absence of nitrogen in any form.

All the above combinations were applied with and without previous liming, and may serve to indicate the relative importance of one or the other kind of plant-food in the economy of this soil. The lime was applied at the rate of 1 ton slaked lime per acre, in April.

The whole experimental area was subsequently green manured with cowpea during the rains, the more luxuriant growth being over the limed part, though the crop elsewhere was a good one. The cowpea was turned in during August, and all the other manures were applied during the third week in October.

In the case of those plots receiving soluble nitrate, as it was thought desirable to have nitrate present at an early stage in the life of the plant to see whether it would prevent the death of the seedlings, the plan was adopted of applying half the nitrate just before sowing, and the second half some weeks later as a top dressing.

Oats was decided upon as the test crop, because up to this time this crop had invariably totally succumbed in the seedling stage, even though well manured with cowdung following green manuring, except where moderate lime dressings or heavy application of wood ashes had been used.

The manuring of the various plots was as follows:—

| Plot. | Manure used. | Rate per acre. | Remarks. |
|---|---|---|---|
| 1 & 1*a* | Ground limestone | 1 ton | |
| 2 & 2*a* | Sodium carbonate | 1000 lbs | Equal to $\frac{1}{3}$ ton slaked lime in neutralising power. |
| 3 & 3*a* | „ „ | 500 „ | Equal to $\frac{1}{6}$ ton do |
| 4 & 4*a* | No manure | — | |
| 5 & 5*a* | Magnesium carbonate | 1000 „ | Equal to $\frac{1}{2}$ ton „ |
| 6 & 6*a* | Potassium do | 328 „ | |
| 7 & 7*a* | „ „ | 164 „ | Containing $K_2O$ equal to that on plot 18 |
| 8 & 8*a* | Ground rock Phosphate | 600 „ | Equal in money value to basic slag, plot 9 |
| 9 & 9*a* | Basic slag | 400 „ | 80 lbs. $P_2O_5$ per acre |
| 10 & 10*a* | Superphosphate conc | 200 „ | „ „ „ |
| 11 & 11*a* | Sulphate of ammonia | 250 „ | 50 lbs. N per acre |
| 12 & 12*a* | Sulphate of lime | 4000 „ | Lime content = $\frac{1}{2}$ ton slaked lime |
| 13 & 13*a* | Calcium chloride | 1000 „ | „ „ = $\frac{1}{3}$ „ |
| 14 & 14*a* | Sodium nitrate | 322 „ | 50 lbs. N per acre |
| 15 & 15*a* | Potassium nitrate | 384 „ | „ „ „ |
| 16 & 16*a* | Calcium nitrate | 384 „ | „ „ „ |
| 17 & 17*a* | Muriate of potash | 224 „ | |
| 18 & 18*a* | Sulphate of potash | 224 „ | |
| 19 & 19*a* | No manure | — | |
| 20 & 20*a* | Sodium nitrate | 322 „ | |
| | Potassium sulphate | 100 „ | |
| | Superphosphate | 200 „ | |
| 21 & 21*a* | Potassium sulphate | 100 „ | |
| | Ammonium sulphate | 250 „ | Superphosphate supplied |
| | Superphosphate | 200 „ | 80 lbs. $P_2O_5$ per acre |
| 22 & 22*a* | Sodium nitrate | 322 „ | Sulphate of potash 50 lbs. |
| | Superphosphate | 200 „ | $K_2O$ per acre |
| 23 & 23*a* | Sulphate of ammonia | 250 „ | Nitrate of soda 50 lbs. |
| | Superphosphate | 200 „ | nitrogen per acre |
| 24 & 24*a* | Sodium nitrate | 322 „ | Sulphate of ammonia 50 |
| | Potassium sulphate | 100 „ | lbs. N per acre |
| 25 & 25*a* | Sulphate of ammonia | 250 „ | |
| | Potassium sulphate | 100 „ | |
| 26 & 26*a* | Potassium sulphate | 100 „ | |
| | Superphosphate | 200 „ | |

The *a* plots had received an application of slaked lime at the rate of 1 ton per acre.

Each plot comprised $\frac{1}{100}$ acre, one half of which received lime.

The final outturns of the plots (grain and straw) were as follows:—

| Plot. | Manure used. | Unlimed subplot. | Limed subplot. |
|---|---|---|---|
| | | lbs. | lbs. |
| 1 & 1*a* | Ground limestone | 7⅛ | 16¾ |
| 2 & 2*a* | Sodium carbonate. Heavy dressing | 4 | 24 |
| 3 & 3*a* | Sodium carbonate. Light dressing | 6½ | 22¾ |
| 4 & 4*a* | Nil | Nil | 16 |
| 5 & 5*a* | Magnesium carbonate | 6½ | 16¾ |
| 6 & 6*a* | Potassium carbonate. Heavy dressing | 7 | 19¼ |
| 7 & 7*a* | Potassium carbonate. Light dressing | 2½ | 20 |
| 8 & 8*a* | Ground rock phosphate | 7½ | 15¾ |
| 9 & 9*a* | Basic slag | 7 | 17 |
| 10 & 10*a* | Superphosphate | ¾ | 15 |
| 11 & 11*a* | Sulphate of ammonia | Nil | 13¼ |
| 12 & 12*a* | Sulphate of lime | ,, | 13 |
| 13 & 13*a* | Calcium chloride | ,, | 10 |
| 14 & 14*a* | Sodium nitrate | ,, | 17¼ |
| 15 & 15*a* | Potassium nitrate | ,, | 18 |
| 16 & 16*a* | Calcium nitrate | ,, | 16½ |
| 17 & 17*a* | Muriate of potash | ,, | 20¾ |
| 18 & 18*a* | Sulphate of potash | ,, | 18 |
| 19 & 19*a* | Nil | ,, | 14½ |
| 20 & 20*a* | Sodium nitrate<br>Superphosphate<br>Sulphate of potash | 5¾ | 21¼ |
| 21 & 21*a* | Sulphate of ammonia<br>Superphosphate<br>Sulphate of potash | Nil | 20 |
| 22 & 22*a* | Sodium nitrate<br>Superphosphate | 4½ | 19½ |
| 23 & 23*a* | Sulphate of ammonia<br>Superphosphate | Nil | 18 |
| 24 & 24*a* | Sodium nitrate<br>Sulphate of potash | Nil | 19 |
| 25 & 25*a* | Sulphate ammonia<br>Sulphate of potash | Nil | 17½ |
| 26 & 26*a* | Sulphate of potash<br>Superphosphate | 2½ | 23 |

The outstanding feature of the results is the action of lime, which has resulted in the production of a good crop on every plot to which it was applied. Of all the unlimed subplots, the only

ones to carry a crop to maturity were those to which basic manures had been added on the one hand, and on the other four plots in which superphosphate was the only constant manurial factor.

It seems extremely improbable that this favourable action of lime and the alkaline carbonates can be credited to any common attribute other than that of providing a base and thus diminishing the soil acidity, and probably rendering harmless the toxic compounds which accompany it.

It has been pointed out by Hilgard and others that an amount of phosphoric acid which, in the presence of a deficiency of lime, may prove insufficient for the crop's needs in respect of this element of plant food, may suffice when lime is present in larger quantities. Confirmation of this is afforded by the author, who finds an increase in the amount of "available" phosphoric acid of the limed plots over those unlimed.

Bearing in mind then the beneficial action observed throughout the experiment to follow the use of phosphoric acid in any form, it is quite conceivable that the action of lime may in part be due to some increase in the availability of the existing phosphoric acid supplies of the soil.

Phosphoric acid probably functions partly as a direct plant food, providing the general soil conditions are such as to permit the plant to survive, and also by its power to stimulate the root system in the early stages of growth as pointed out by Russell, whereby among other things the extra-cellular root oxidation would probably be increased, leading to destruction of toxic material, the survival of the plant might be rendered possible. Experiments on seedlings in culture solutions of the toxin are cited which render support to this view.

Another point of interest revealed by the experiments was the injurious effect of ammonium sulphate in the absence of lime, presumably due to its acidic nature. When used alone it proved toxic even for weeds, subplot 11 being absolutely bare of all vegetation whatsoever. The crop on this plot was killed off earlier than on the plots receiving no manure at all. Even phosphate and potash together failed to neutralise the deleterious action of sulphate of ammonia.

Potash in fact seemed to be without any beneficial influence except where used as the alkaline carbonate. The results being shown by the second year's crop of oats conform very closely to those of the first year, and at present suggest no modification of the

conclusions that have been drawn therefrom. It is mentioned however that the ground limestone plot shews a great improvement on the previous year, which, indeed, was to be expected.

Although the evidence indicates clearly the presence of a toxin in this Jorhat soil it does not follow that this is a characteristic of all acidic soils, although deficiency in basic constituents, together with lack of aeration and poor drainage, is undoubtedly a favouring condition to the formation of such substances.

[It seems by no means unlikely that the difficulties experienced in establishing certain leguminous cover crops, *e.g.* Soy beans, in Malaya may be directly connected with excessive soil acidity, and, as pointed out in a recent article,* the fact that liming has so far not met with the success expected of it may be attributed to the employment of inadequate amounts. On the other hand it may prove that trees and deep rooted plants may be non-susceptible to toxin fatal to more delicate plant organizations.]

M. Barrowcliff.

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## METHODS AND MATERIALS FOR THE CONTROL OF INSECT PESTS.

### PART 2.

BY P. B. RICHARDS.

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### Chemical Measures. I. Stomach Poisons.

### NATURE OF INJURY AND CHOICE OF REMEDY.

The direct injury caused by insects to plants is mainly inflicted in one of two ways: the tissues of the plant are chewed and eaten, or the juices of the plant are sucked. The form of the mouth-parts, as those structures are called which surround the mouth and which are used for feeding, is very different in the insects which feed in the one or the other of these ways. Insects that feed upon the plant tissues have short biting mouth-parts adapted for cutting or tearing their food. This type of mouth-parts will be found on the young and adults of cockroaches, locusts, grass hoppers and crickets, on the caterpillars of all butterflies and moths, on the larvae and imagos (adults) of all vegetable-

* Agricultural Bulletin Vol. III 2 p. 48.

feeding beetles, on the larvae of sawflies, and in a modified form on "White ants," thrips and book-lice. On the contrary, those insects which feed on the juice of plants or the blood of animals have the mouth-parts modified for piercing and sucking. They require to penetrate the outer protective covering of their host to reach their liquid food, whether in blood vessels or in the cells and vessels of plants, and to provide a channel or tube through which the fluid can be drawn into their alimentary canals. One finds that the mouth-parts of such insects form a tubular beak provided with sharp piercing instruments with which to make the necessary puncture. This type of mouth-parts is confined, among noxious insects, to domestic and plant-feeding bugs, the latter including green fly and scale insects, to fleas, and to mosquitos and other blood-sucking flies.

Other types of mouth-parts are to be found among insects, such as the proboscis of butterflies and moths, the lapping tongue of bees, and the long sharp grasping jaws of insects that prey upon other insects: but for the rough diagnosis of injurious insects the short biting mouth-parts and the piercing sucking beak are the only ones of importance. It is essential to be able to distinguish between these as the remedies to be applied depend almost entirely upon their accurate determination.

All insects which possess biting mouth-parts do not of necessity feed on the tissues upon the outside of a plant. Some feed on the roots below ground, others burrow in the stem, many bore into the fruits, while still others live between the surfaces of the leaf, feeding upon the soft tissues underlying the epidermis. By far the greater number, however, feed by devouring the foliage, and it is against these that the simplest and most effective method of eradication can be employed: that of poisoning the foliage upon which the insect is feeding.

Very little is known of the physiology of insects, and it is by no means to be taken for granted that substances poisonous to human beings will also be poisonous to them. Until quite recently, however, some such assumption would appear to have been made. It is certainly the case that the majority of the substances at present recommended as Stomach Poisons against insects are also poisonous to ourselves. Further experiments may quite reasonably be expected to reveal substances poisonous to insects, which are harmless to the higher animals.

Both vegetable and mineral stomach poisons are used, the vegetable poisons generally consisting of solutions of alkaloids such

as infusions of nicotine, hellebore root, pyrethrum, and tuba root. Whereas vegetable poisons have been largely used in the past, the tendency of modern spraying methods is towards the almost absolute use of mineral poisons. Alkaloid infusions, however, should not on this account be considered obsolete. They are not to be recommended for use on field operations on a large scale, but to small cultivators and to gardeners they are of considerable value.

METHODS OF APPLICATION.

Stomach poisons are applied in two ways; either the substance is dusted on to the leaves in a fine state of division by hand or with a "powder gun," or it is dissolved or suspended in water as a "wash" or "spray-fluid" which is distributed over the plant by a syringe or spraying-machine.

(*a*) *Dusting.*

For applying in the dry state the poison is usually mixed with lime, powdered gypsum or wood ashes. When applied by hand the powder is dusted through a cloth. For large areas this is too slow a process so a powder bellows or a geared powder-gun is employed. In the best type of the latter, a constant current of air is maintained by a rotary fan, and the quantity of powder and the direction can be regulated. Dry dusting is a useful method for the application of poisons to young field crops. If the crop is planted in rows, a very simple and effective device is to hang bags made of loose material at the requisite distances apart on a pole so that a bag is over each row, and to have it carried by coolies or slung across an animal's back. The jarring in walking along shakes the powder from the bags on to the young plants.

(*b*) *Spraying.*

It is probable that most, if not all of the stomach poisons used on a field scale in Malaya for some time will be in the form of spray fluids. The apparatus designed for the application of spray fluid to plants varies from hand "atomisers" costing a dollar or two and suitable only for very light work, up to power plants with underground mains, capable of feeding a large number of nozzles from a central mixing and pumping station.

The object to be aimed at in spraying stomach poisons is the even distribution of the insecticide over the plant without waste. This is attained by using apparatus which breaks up the fluid into a fine mist, in which state it is discharged over the plant. The mist settles on leaves and stem, the water evaporates, and a de-

posit of the stomach poison is left upon the plant. It will quickly be found, in practice, that there is a limiting point beyond which spraying should not be continued. At this point the spray fluid, no matter how finely atomised, tends to collect into drops and drip from the leaf. Any further spraying is not only wasteful but harmful, as the maximum wetting of the surface is obtained just before the globules form. At the first sign of dripping, therefore, spraying with a stomach poison should cease. This does not apply to contact poisons, the conditions for the application of which are different.

### SPRAYING APPARATUS.

(i) *Hand Atomisers.*

The cheapest form of spraying apparatus suitable for stomach poisons is the hand atomiser. This consists of a glass or metal tank holding about a quart, to which is attached a pump which forces air out of a fine nozzle across the opening of a small tube set at right angles and dipping into the tank. A small quantity of the insecticide is sucked up this tube by the current, and is distributed in a very fine spray in the air jet. This type of apparatus is suitable only for house plants or small gardens as the spray covers little surface. It is, however, cheap, and can be made locally by Chinese tin-smiths. With it small colonies of sucking insects can readily be treated with contact poisons, and the regular use of such an appliance in small cultivations would save a multitude of sorrows.

(ii) *Syringes.*

Ordinary syringes provided with a rose are not satisfactory for applying stomach poisons, as they do not break up the liquid into sufficiently small drops. A very useful implement for use on flowering plants, ornamental shrubs, vegetables and small fruit trees is a syringe fitted with a spraying nozzle. If the nozzle is adjustable or nozzles of different gauge are provided, so that the sprays suitable to stomach or contact poisons can be obtained, so much the better. Such an implement is the "Abol" syringe fitted with the Abol improved Nozzle, the price of which, in England, is from 9/6 to 15/6 according to size.

(iii) *Bucket Pumps.*

For spraying small areas a bucket pump is a very useful implement. The pump is separate from the reservoir, for which a bucket or kerosene tin can be used. The spray fluid from the reservoir is discharged through a flexible hose. Two types are

obtainable, one giving a jet only during the downward stroke of the pump and the other maintaining a steady pressure throughout. The latter is, of course, the more efficient, saving both time and material, but it is also more expensive to buy.

Bucket pumps are suitable for spraying low-growing bushes, such as coffee, and for small fruit trees for which an extension rod may be fitted to the hose. This type of apparatus suffers from the disadvantages that the reservoir has to be moved along a few feet at a time, and that it is not always easy to manipulate the nozzle at the same time as one is working the pump.

(vi) *Knapsack Sprayers.*

These consist of a tank with pump attached, provided with straps to fasten the apparatus behind the shoulders. The tank holds 3 or 4 gallons of spray fluid, the pump may be inside or outside the tank, and the pump handle projects in front, either over the shoulder or under the arm. The pump is worked by one hand, while the other directs the nozzle. An efficient knapsack sprayer is quite the best type of spraying apparatus for use on a small scale. Sound types such as the Vermorel and Four Oaks sprayers can be obtained locally. When fitted with disc or Vermorel nozzles they are effective up to a height of about seven feet, while with a Bordeaux nozzle about double that height can be reached. The Bordeaux nozzle, which is much favoured in India, is adjustable and delivers a flat, fan-shaped spray or a solid jet or any intermediate form. The Vermorel and disc nozzles give cone-shaped sprays, and are automatic.

(v) *Barrel pumps.*

These consist of a powerful hand pump of vertical or horizontal type, attached to a barrel mounted on wheels or on a convenient frame for transport. They are capable of delivering from 1 to 4 gallons per minute and usually work at a pressure of 80 to 125 pounds. Two leads of hose and nozzles are usually carried. The horizontal pump is the better type as the pressure is maintained more easily since both strokes of the pump count. A good barrel pump will spray up to 3039 feet, and is an efficient machine for spraying small plantations of young coconuts up to five years old.

(vi) *Manual engines.*

Various types of these are on the market. Most are readily portable, and with three or four coolies at the pump will supply four nozzles at very considerable pressure. Merryweathers Ltd.,

Greenwich, and Drake and Fletcher, Maidstone, England are two of many manufacturers who turn out efficient machines.

(vii) *Power Sprayers.*

Power outfits consist of an engine which may be steam, oil, or petrol driven, geared or belted to a powerful pump with a large tank for reservoir. They work at a pressure of 200 pounds or more and deliver from 4 gallons upward of spray fluid per minute. Where a large number of trees have to be sprayed, power sprayers are much more efficient than manuals. They effect great saving in labour, and what is of much greater importance, in time. The more rapidly spraying can be carried through against a pest the better, both on account of saving the foliage or crop, and because the whole of the pest may be exterminated over a wide area. With the heavy pressure obtainable from a power outfit, it is possible to spray very high trees from the ground. For this purpose a nozzle is employed which consists of a heavy brass tube, 3 to 6 feet in length, with gradually diminishing bore ending in a simple round aperture one eighth to three eighths of an inch in diameter. This throws a solid jet which breaks into a fairly fine spray when near the summit of its arc.

Portable engines which can readily be carried by coolies are made for estate work by Merryweather's Ltd. In view of the susceptibility of coconut palms to caterpillar attack, no big coconut plantation should be without some such apparatus.

### ARSENIC COMPOUNDS.

Arsenical salts have been, and still are the most widely used and most easily obtainable of all the stomach poisons. It will be convenient, therefore, to deal with them first.

The use of arsenic was probably suggested by its known poisoning effect upon warm blooded animals. London Purple (calcium arsenite) and Paris Green (aceto-arsenite of copper) were, until recent years, the form of arsenic most used. They are, however, now largely superseded by lead arseniate.

#### *Calcium arsenite. London Purple.*

*Preparation.* London Purple, which is a waste product in aniline dye manufacture, consists of a mixture of arsenite and arseniate of lime. The arseniate of lime is partly soluble in water, and as soluble arsenic salts damage foliage it is necessary to add an equivalent amount of lime in the form of milk of lime to render it harmless. London Purple is mixed with water for spraying in the proportion of 1 pound to 100 or 150 gallons.

Calcium arsenite can be prepared by dissolving 1 pound of white arsenic (arsenious acid, $As_2O_3$) in 2 gallons of water and mixing into the solution a milk of lime (lime wash) containing 4 pounds of lime. The mixture is then boiled for half an hour, after which it is made up to 100 gallons with water. It is then ready for use.

*Properties.* Calcium arsenite is very insoluble in water; therefore it will not burn foliage if pure. To be on the safe side the mixture should, however, always contain an excess of milk of lime. The precipitate is very fine and keeps in suspension better than any other arsenic salt. In the strength given it is toxic to all plant-eating caterpillars. It is also toxic to cattle, so should not be sprayed where cattle may feed. It is not very adhesive, so that it is fairly easily washed off by rain.

*Use.* Calcium arsenite can be used as a spray, and London Purple as a spray or dusting powder against all kinds of caterpillars and beetles which feed upon leaves. They are especially useful against insects attacking growing fruit and fruit trees. Spraying during flowering should, however, be avoided. They can also be used for spraying vegetables provided sufficient time elapses to allow the rains to wash off the poison before the vegetables are used.

If used as a spray fluid, a nozzle giving a fine misty spray should be employed. Spraying should cease immediately any tendency to drip is observed. For use as a dusting powder, 1 part by weight of London Purple should be mixed with 20 to 50 parts of finely powdered gypsum or sifted wood ashes, and should be dusted on to the leaves before the dew is off them.

London Purple is variable in its composition, so is not as reliable as precipitated calcium arsenite. The price of London Purple in Kuala Lumpur is $1 per pound.

### *Copper aceto-arsenite. Paris Green.*

*Preparation.* Copper aceto-arsenite can be prepared by dissolving 4 pounds of white arsenic (arsenious acid) in 5 gallons of water and mixing with this 5 pounds of verdigris in 5 gallons of water. The mixture is then boiled for an hour and a little acetic acid added. 1 gallon of this stock solution makes 150 to 200 gallons of wash. To this should be added lime wash containing 2 or 3 pounds of lime.

Copper aceto-arsenite is in commerce as Paris Green, or Schweinfurth Green. It is readily obtainable, and there is little

advantage in preparing the substance for oneself. To make a spray fluid with Paris Green, 1 pound of the powder is mixed to a paste with the gradual addition of water and is then made up to 200 or 300 gallons. To this is added lime wash containing 10 pounds of lime. Very little water is required for the purpose of making the paste. The powder should never be added to the water in the reservoir as mixing in this way is very laborious. When first mixed into a paste, subsequent mixing in the reservoir is easy.

For use as a dusting powder, 1 pound of Paris Green is mixed with 3 or 4 pounds of fine, air-slaked lime, and this is then mixed with 20 to 50 pounds of wood ashes or finely powdered gypsum. The mixture is dusted on to dew-charged leaves by one of the methods previously indicated. On account of the tendency to leaf burning by the soluble arsenic apt to be present in the substance, Paris Green is not so satisfactory for dusting delicate foliage as London Purple or Lead arseniate.

*Properties.* Precipitated copper aceto-arsenite is a very fine green powder which readily remains in suspension, so is easy to distribute evenly over foliage. Paris Green does not remain suspended in the water nearly so well, so the spray fluid should be agitated either by hand or with an automatic agitator. This is one of the disadvantages of using the commercial product. Another is that Paris Green usually has some soluble arsenic and soluble copper, both of which damage the green parts of plants. Copper aceto-arsenite is not absorbed by plant-tissues nor does it damage them when pure. It is, on the other hand, the most violent stomach poison known for insects.

*Use.* Paris Green is effective against all biting insects, a small quantity sufficing to cause death. It is, however, also fatal to man and cattle in small doses, and therefore cannot be employed indiscriminately. It should not be spread upon fodder, upon fruits or vegetables soon ready for use, or upon vegetables which possess corners in which the poison may lodge. It is quickly washed off by rain, a fact which, for general spraying purposes in such a climate as that of Malaya, constitutes a grave disadvantage. This can be remedied to some extent by the addition of 5 pounds of sugar or molasses, or 2 gallons of rosin wash* per 100 gallons of spray. The spray fluid is applied as a fine misty spray, and spraying should proceed down the wind if possible. When dusting, the operator should work backwards against the wind to obviate the inhalation of the fine powder.

* The prescription for rosin wash will be given in a subsequent number.

The price of Paris Green in Kuala Lumpur is 38 cents per pound.

*Copper Arsenite. Scheele's Green.*

*Preparation.* Dissolve 1 pound of sodium arsenite in 1 gallon of water and add gradually 2 pounds of green vitriol (copper sulphate) dissolved in 1 gallon of water. A fine green precipitate is obtained. To this is added lime wash containing 5 pounds of lime, and the whole is made up to 200 gallons with water.

*Properties.* Scheele's Green is nearly insoluble in water. It therefore rarely causes leaf burning. It is very poisonous to insects and to animals and must be used with as great precaution as Paris Green. The precipitate is very fine and remains in suspension a long time.

*Use.* Scheele's Green is applicable to the same conditions as Paris Green and is equally efficacious. It is easier to make than the aceto-arsenite.

*Lead Arseniate.*

*Preparation.* Dissolve 3½ pounds of arseniate of soda crystals in 8 gallons of water in an earthenware vessel. Dissolve 7 pounds of lead acetate in as little water as possible, and mix. A white precipitate of lead arseniate forms. This is sufficient to give from 480 to 800 gallons of spray fluid, according to the strength required, equivalent to 1 pound of lead arseniate to 60 to 100 gallons of water.

Lead arseniate is obtainable commercially in the form of powder or paste. The powder is useful for dusting, but is not to be recommended for spraying on account of the difficulty of mixing. The paste, which usually contains 33% of water, readily mixes with water to form a very effective spray fluid. The powder does not remain in suspension so well as the freshly prepared precipitate, but an occasional stirring suffices to give a uniform spray. To make the spray-fluid, 1½ pounds of paste, equivalent to 1 pound of lead arseniate, is mixed with 60 to 100 gallons of water. The addition of 5 to 10 pounds of slaked lime increases the covering power, so may be advantageous, but there is no need to use lime to prevent burning as in the case of copper arsenic compounds.

*Properties.* Lead arseniate is a white heavy powder. It is one of the most insoluble of all the arseniates in water. It has no burning action upon the foliage of plants. This is one of its great advantages over all other commercial arsenic insecticides. Another

is that it is singularly adhesive. Once the spray has dried on the foliage, it withstands rain remarkably well, retaining its toxic value for some weeks. Being white it is also easier to see upon the plant than the copper-arsenic salts.

Lead arseniate is poisonous to insects and to man and cattle, but not in such small doses as Paris Green. When mixed with water at the rate of 1 pound to 60 gallons and sprayed on to foliage it is poisonous to all insects eating the sprayed leaves. At the rate of 1 pound to 100 gallons with admixture of 3 pounds of lime and 5 pounds of low-grade sugar, it is effective as a poison to most insects but is comparatively safe to cattle. It could therefore be used at this strength for spraying in kampong land.

*Use.* Lead arseniate is by far the best of the known stomach poisons for general purpose. It is superseding Paris Green as a dusting powder and as a spray on account of its adhesiveness and because it does not damage the plants. It is applicable in one or other form to all kinds of leaf-eating insects.

Against the majority of leaf-eating caterpillars and beetles a spray containing 1 pound of lead arseniate to 60 gallons of water is effective. If the leaf is very thick or leathery, so that a relatively small area of surface is eaten, it may be well to increase the strength to 1 pound in 25 or 30 gallons. This can be done without any risk to the plant, but of course increases the cost of the spray fluid per gallon.

A wash containing 1½ pounds of paste to 60 gallons of water, with the addition of 5 to 10 pounds of lime per 100 gallons is recommended for treating skipper caterpillars on coconuts and on bananas.

When used as a dusting powder, lime, gypsum, or wood ashes can be mixed with the dry powder to increase the covering power. Dusting is not likely to be of wide application in Malaya, however, as there are few crops upon which this treatment would have any advantage over spraying.

The cost of lead arseniate paste should not exceed $30 per cwt.

(Further arsenic and other stomach poisons will be considered next month.)

# PROGRESS REPORT ON LOCUST WORK FOR THE MONTHS OF JULY, AUGUST AND SEPTEMBER, 1914.

F. W. SOUTH AND F. DE LA MARE NORRIS.

## General.

During the month of July the work proceeded as usual and consisted mainly of locating flying swarms, as hoppers were only present in the Tampin district of the Negri Sembilan. The work was somewhat interrupted in August owing to the outbreak of the war and a reduction in staff had to be made, but before the end of the month it was progressing again vigorously. The fresh arrangement came into force at the beginning of September. On the whole the interruption had very little effect on the success of the work and satisfactory results were obtained throughout the three months. An interesting feature was the appearance of flying insects in the Temerloh district in August. Two swarms of these bred near Temerloh, but the Assistant Agricultural Inspector, Selangor, with the vigorous co-operation of the District Officer succeeded in exterminating all the hoppers produced and the district was free from locusts at the end of September. On the whole the insects have been kept well under control throughout this period.

## Selangor.

During July flying swarms only were present in Selangor mainly in the neighbourhoods of Kuala Lumpur and Kajang and on the Negri Sembilan-Selangor border where they were continually crossing and recrossing from one State to the other.

Eggs were laid towards the end of August in the neighbourhood of Cheras and of Sungei Besi while at the beginning of September more eggs were deposited in the vicinity of Kajang.

At the beginning of September hoppers were hatched from the breeding grounds found in August and destruction work was recommenced. On this occasion the poisoning method was attended with notable success and became the mainstay of the work; resort was only had to the bag trap when poisoning was attended with risk to cattle. The main centres of operations were at Salak South, between Serdang and Kajang, between Cheras and Kajang, between Kajang and the 20th mile on the Reko Road and at Semenyih. Towards the end of September further breeding grounds were found near Kuala Lumpur at Hawthornden Estate,

on the Rifle Range, at the District Hospital and in mining land at Setapak. Work was still in progress at the end of the month.

The results obtained during the period were;
By bag trap, 2073 tins representing 108 swarms.
By poisoning 299 swarms.

### The Negri Sembilan.

*Coast District.* Flying swarms only were present in this district during the period under consideration. There was, however, some difficulty in keeping them under observation owing to the difficult nature of the country. It is, therefore, possible that some escaped notice and were breeding in the large lalang tracts in that district. The absence of hoppers is noteworthy as both flyers and hoppers had previously been present continuously since the beginning of the campaign.

*Seremban and Jelebu Districts.* In July both these districts were free from hoppers, but at the end of August breeding grounds were reported at Lenggeng and Jelebu and early in September others were found between Lenggeng and Broga. The insects arising from these breeding grounds were all speedily destroyed.

*Tampin District.* Hoppers appeared early in July and throughout the month destruction work continued. The chief centres of work were Ayer Kuning, Batang Malacca and Kampong Batu, and later in the month Gemenche. These continued to be the centres of work throughout the month of August. The catches were on the whole satisfactory, though several swarms developed into fliers. By the second week in September work had ceased but the cessation did not last long and at the end of the month destruction work was again in progress at Keru, Gemas and Batang Malacca.

*Kuala Pilah District.* No hoppers were recorded here until September. They then appeared in large numbers in the triangle of land lying between Kuala Pilah, Johol and Bahau. These swarms were vigorously attacked by the Special Assistant and by the end of the month some very successful work had been carried out.

The results in the Negri Sembilan were:—

By the bag trap method. 1887 tins representing 589 swarms.
By poisoning. 160 swarms.

PAHANG.

During August three swarms of flying locusts, or probably one large swarm that had subsequently divided into three parts, entered Pahang and travelled along the railway line from the vicinity of Bahau. The three portions all finally reached Mengkarak, one then turned and flew back to Negri Sembilan; of the two others one followed the railway as far as Semantan and the other, cutting a short distance across country, reached the Pahang river and followed it up stream to Temerloh. The first of these swarms, which was the smaller of the two, deposited eggs around Semantan, the majority being between the Semantan River and the Temerloh track. Two or three of the resulting hopper swarms were of a fair medium size; these and the smaller ones were all successfully dealt with in the latter part of September. The flying swarm that gave rise to these was kept under observation but apparently soon died out. The second and larger swarm deposited eggs all around Temerloh and then went to the Songsang district: it was here that the largest breeding grounds were found. Complete success however attended the poisoning in these districts, as in that of Semantan, and all the swarms were speedily exterminated. In a few cases only, when the poison offered danger to cattle, was resort made to the bag trap method. The swarm then returned down the river laying eggs practically throughout the river district on the right hand bank. When it reached a point opposite Mengkarak it divided, one portion going a few miles down the river and depositing eggs in the land on the left hand bank, the other returning to Mengkarak. The majority of the hoppers had all been destroyed by the end of September and the few remaining ones have since been successfully exterminated.

About 250 swarms of hoppers were destroyed and apparently the generation was completely exterminated.

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## MINUTES OF MEETING OF THE PLANTERS' ASSOCIATION OF MALAYA,

*Held at 11 a.m. on January, 3rd 1915, at the Chamber of Commerce, Kuala Lumpur.*

*Present*: Chairman: The Hon'ble Mr. E. Macfadyen.
Delegates: from Batang Padang D.P.A. F. J. Ayris.
Batu Tiga D.P.A. T. J. Cumming and A. W. Brodie.

Central Perak P.A.: A. B. Milne.
Kajang D.P.A.: Messrs. P. F. Wise, E. G. Leyne and R. C. M. Kindersley.
Kapar D.P.A.: Messrs. E. W. Harvey and A. Mabler.
Klang D.P.A.: Messrs. E. B. Prior and J. French.
Kuala Langat D.P.A.: Messrs. H. L. Carter and R. W. Munro.
Kuala Lumpur D.P.A.: Messrs. F. G. Harvey, V. Utterson Kelso, F. Clyde Jeavons, J. A. Bair and W. L. Leggatt.
Kuala Selangor D.P.A.: Messrs. Thomas More, O. Pfenningwerth, Thomas H. Menzies and G. W. Bradburne.
Lower Perak P.A.: Messrs. Maurice Maude and F. Zernichow.
Negri Sembilan P.A.: Messrs. A. Dupuis Brown, J. D. McCulloch, C. Ritchie and P. W. N. Farquharson.
Ulu Selangor D.P.A.: Messrs. F. W. Davies and M. D. Fallon.

*Honorary Member*: Mr. L. Lewton Brain, Director of Agriculture.

*Visitors*: Messrs. R. F. Talbot (Batu Tiga), C. E. Harston (Perak), S. Mabler (Kapar), E. G. Leggatt (Kuala Kubu), R. C. Kinder (Batu Caves), A. A. Mulloy (Klang), C. St. John Wright (Kuala Lumpur), J. Hunter (Kuala Selangor), G. Pfenningwerth (Kuala Langat) and L. W. Tivy.

*Secretary*: Mr. H. C. E. Zacharias.

1. The Minutes of the previous meeting are, on the motion of Mr. Jeavons, seconded by Mr. Prior, taken as read, confirmed and signed.

2. The War.

The Secretary reads the following correspondence:—

"Kuala Lumpur, 22nd October, 1914."

"Chief Secretary, F. M. S.,
Kuala Lumpur."

"Sir,

I have the honour to inform you that at a Meeting of this Association held on the 18th inst. I was instructed to submit to you the following resolution, which has been carried unanimously:

'That the Government be asked to send Home Europeans 'suitable for military service and ready to give an undertaking 'that they will enlist in the British Army in any capacity'."

"I have, etc.,
(Sgd.) H. C. E. Zacharias,
Secretary."

"Kuala Lumpur,
28th October, 1914."

"Sir,

I am directed to acknowledge the receipt of your letter of the 22nd October, submitting a resolution passed at a Meeting of the Planters' Association of Malaya regarding the sending home of Europeans suitable for military service, and to say that some weeks ago His Excellency the High Commissioner telegraphed to the Secretary of State that if the sanction of the War Office was obtained for the General Officer Commanding to enlist men for the new army, the local Government would pay their passages to England.

His Excellency has now received a telegram from the Secretary of State that there are difficulties as regards enlisting here but the General Officer Commanding is authorised to require the Military Medical department to examine the men who come forward and if they pass the medical Examination and come up to the required standard their passages will be paid by the local Government.

The General Officer Commanding will no doubt issue a notice on the subject in connection with this. I am to invite attention to the Straits Settlements Gazette Extraordinary of the 27th October Notification No: 1306 which sets forth the conditions."

"I have, etc.,
(Sgd.) J. F. Owen,
Ag: Under Secretary, F. M. S."

"The Secretary,
The Planters' Association of Malaya,
"Kuala Lumpur, 22nd December, 1914."

"The Secretary,
Rubber Growers' Association,

Dear Sir,

I am instructed by the Standing Committee of my Association to refer to your circular on "Emergency Finance" dated 8th September last, and detailing negotiations between your Association and the Colonial Office on the subject indicated.

This matter is of historical interest only now, or at any rate we may hope that it is so; but as the information supplied to you through the Colonial Office by no means correctly represents what occurred out here, it would appear to be worth while, even after this lapse of time, to correct the impression given.

The interests of estates on this side were represented, in conference with the Acting High Commissioner, by Messrs. Skinner and Macfadyen: the former an ex-Chairman and the latter present Chairman of this Association, both Members of the Federal Council of the Federated Malay States. Mr. Skinner has since retired but before, recently, leaving for Home asked that your circular should be replied to and the mis-statements corrected. Doubtless Mr. Skinner will confirm the following account of what occurred; which has been supplied to me by Mr. Macfadyen.

On the day war was declared the High Commissioner, after discussion with our representatives in Kuala Lumpur, announced the sum of money he would be able to allocate for the assistance of Estates, should such assistance prove to be necessary. Our representatives pressed for a more generous allocation but were only able to secure a promise that, if the Banks were willing to provide the F. M. S. Government with a credit for the purpose, the Government would be willing to lend the Estates up to $2,500,000—the sum which Messrs. Skinner and Macfadyen estimated, at that time, to be the minimum likely to be required for emergency finance.

The Kuala Lumpur Agents of the Chartered, Hongkong and Mercantile Banks were willing, but unable without the concurrence of their Singapore offices, to assist in the manner suggested. Messrs. Skinner and Macfadyen, with the Kuala Lumpur Agent of the Chartered Bank, Mr. Argyll Robertson, went to Singapore in the hopes of arranging this but failed to do so.

They then interviewed His Excellency, in Singapore, on August 6th when His Excellency intimated that he could extend his limit to $400,000 for the F. M. S. and $200,000 for the Straits Settlements. This was a considerable extension of the original allocation.

It was laid down, however, that this assistance of Government was to be available only for the prevention of absolute destitution and consequently was to be limited, under various safeguards, to the provision of sufficient sums in each case to feed starving coolies until such time as they could conveniently be repatriated.

Asked by His Excellency how this money had better be distributed over the country, our representatives made suggestions on

the subject but Mr. Macfadyen is at a loss to understand, after what had occurred and the estimates furnished by Mr. Skinner and himself of the amounts required to finance the estates if they were to carry on their business of producing rubber, how His Excellency could have formed the impression that this allocation on the lines laid down was all that they had asked for. My telegram of August 17th despatched at Mr. Macfadyen's instance gives a correct view of the attitude of Mr. Skinner and Mr. Macfadyen to the whole question.

This telegram was sent owing to agents here being instructed by their principals in London to avail themselves of Government assistance to an extent which indicated how completely it was misunderstood at Home.

I may add that loans for $400,000 in the F. M. S. were only "sanctioned" in the sense of the word that Residents of States were authorised to lend up to such amount on the lines laid down. The total amount actually lent in the F. M. S. was $19,909. Naturally it was only in the very last resort that planters would apply for assistance, on the terms of having to repatriate their coolies."

"I am, dear Sir,
Yours faithfully,
(Sgd.) H. C. E. Zacharias,
Secretary."

"Klang District Planters' Association."

"The Secretary,

Planters' Association of Malaya,

Dear Sir,

I am instructed to forward to you the following resolution adopted at the recent Meeting of the Klang D.P.A. and framed on the same lines as that adopted by the Committee of the Negri Sembilan Planters' Association:

"That the Klang D.P.A. views with grave alarm the recent proposals of the F. M. S. Government for the postponement of Government works and consequent great reduction in expenditure, as outlined at the recent Meeting of the Federal Council."

The Klang District Planters' Association would draw your attention to:—

The unsettling effect upon labour, probably leading to disturbances and consequent repatriation of coolies, the greater num-

ber of whom were originally imported at the expense of the planting and mining communities.

2. The disastrous effect on a labour market, depleted by repatriation, when the postponed Government works are eventually resumed.

3. The financial loss to contractors, merchants, shopkeepers and others that will immediately follow the excessive cutting down of State expenditure.

4. The disparity between the contemplated action of the F. M. S. Government in reducing expenditure and the policy of the Home Government in making every possible endeavour to guard against unemployment."

"Yours faithfully,
(Sgd.) C. A. Buxton,
Hon. Secretary."

Mr. *Macfadyen* remarks that on the matter of enlistment a very large proportion of the junior members of the planting community had gone Home, either at their own expense or at the cost of the Home Government, travelling steerage, or more recently, with a view to taking up commissions at Home, at the expense of the local Government. So far no list of the people who had proceeded Home might apparently be made public, but it was pretty well known to all of them that if such a list could be published it would be found that the F. M. S. and S. S. had certainly borne their share in the volunteering movement. He suggests obtaining from constituent associations material from which to compile such lists when they should be allowed to be published.

*b.* Resumption of Immigration.

The *Secretary* reads the following two letters:—

"Kuala Lumpur, 22nd October, 1914."

"Under Secretary, F. M. S.,

"Sir,

I have the honour to inform you that I have been instructed to submit to you the following resolution, passed unanimously at a Meeting of this Association held on the 18th inst., viz:

"That assisted Immigration from India be resumed at as "early a date as possible, and that the repatriation of all able "bodied estate labourers be discontinued forthwith."

"I have, etc.,
(Sgd.) H. C. E. Zacharias,
Secretary."

"Kuala Lumpur, 7th December, 1914."

"Under Secretary, F. M. S.,

"Sir,

I have the honour to confirm my letter of Oct. 22nd on the subject of the resumption of immigration from India, to which I am as yet without a reply, and to point out that since then practically every Constituent Association has passed resolutions similar to the one submitted to you by me. Quite a number of Estates are already feeling the pinch of a shortage of labour and the situation in many cases is becoming so acute, that, I am to submit again, immediate steps are urgently called for."

"I have, etc.,
(Sgd.) H. C. E. Zacharias,
Secretary."

The *Secretary* reports that he had so far secured no reply and that the Batu Tiga, Johore, Kuala Lumpur, and Klang associations had passed strongly worded resolutions urging the immediate resumption of immigration from India.

Mr. *Macfadyen* informs the meeting that between those two letters the Immigration Committee met and were strongly in favour of resumption of immigration. He understood they also up to date had received no reply.

Mr. *Prior* predicts a catastrophe if something were not done soon. He proposes that a deputation wait on the Chief Secretary.

Mr. *Brodie* recommends a general refusal to pay the Indian Immigration assessment, pending immigration being resumed.

Mr. *Farquharson* strongly supports the necessity for immediate action and seconds Mr. Prior's proposal re deputation, which he suggests should consist of Messrs. Macfadyen, Milne and Brodie.

Mr. *F. G. Harvey* remarks that if no satisfaction was obtained, a deputation consisting of every planter in the Peninsula had better be formed.

Mr. Prior's proposal is carried.

### 3. London (1914) Exhibition.

The *Secretary* points out that the total cost of the Malayan Exhibit at the London Exhibition was $19,983.03, and the Association having guaranteed up to £1,000, the Government would have to pay $11,411.60. The total of contributions received by the P. A. M. to date yielded $10,111.89, and after payment of their share, and other expenses, including £50 for a cup for the Batavia

Exhibition, they had a balance of $1,133.09, which, as proposed, would go to form the nucleus of an Exhibition Fund.

4. Bagan Datoh.

There being no delegate from Bagan Datoh present, the Chairman observes that the last letter was worded so strongly, as to make it inadvisable to proceed with the matter, without fuller discussion and support from the constituent association concerned. He would suggest allowing the matter to stand over until their next meeting.

Agreed to.

5. Absconders.

The *Secretary* reads the following correspondence:—

"Kuala Lumpur, 7th December, 1914."

"Under Secretary, F. M. S.,

"Sir,

I am instructed by the Standing Committee of this Association to approach you in regard to the administrative difficulties in the way of employers when endeavouring to obtain the arrest of absconded coolies, and to submit that Magistrates be appointed in future in and for the State instead of in and for the District, served by their Courts, as hitherto."

"I have, etc.,
(Sgd.) H. C. E. Zacharias,
Secretary."

"Kuala Lumpur, 12th December, 1914."

"Sir,

Referring to your letter of the 7th December, 1914, I am directed to point out that it is already the practice to appoint Magistrates in and for their States."

"I have, etc.,
(Sgd.) A. Caldecott,
f. Ag. Under Secretary, F. M. S."

"The Secretary,

The Planters' Association of Malaya,

The *Secretary* also reports having received from the Batu Tiga D.P.A. the following copy of a letter addressed by them to the British Resident of Selangor:—

"(Copy)"

"Batu Tiga District Planters' Association."

"24th December, 1914."

"The Secretary to the Resident,
Kuala Lumpur."

"Sir,

I have the honour to inform you that at a General Meeting of this Association held on the 16th instant the following resolution was passed:—

"That Government be approached with a view to allowing "a Government Official at Port Swettenham to issue warrants "for the arrest of absconding coolies on the personal applica- "tion of a European."

It was pointed out at the meeting that a large number of absconders take boat from Port Swettenham and if found there, there is no time to take a train back to Klang, procure a warrant and return to Port Swettenham before the departure of the boat."

"I have, etc.,
(Sgd.) R. F. Talbot.
Hon. Secretary."

Mr. *Cumming* explains the difficulties of the case.

Mr. *Jeavons* concurs that many coolies were able to abscond, because there was no magistrate at Port Swettenham with authority to issue warrants.

Mr. *Carter* suggests that the simplest solution would seem to be for the Assistant Controller of Labour to be in Port Swettenham, whenever a boat sailed for India, he being fully authorised to issue warrants.

Resolved to await the Resident's reply to the Batu Tiga D.P.A. and to pass same on to the Standing Committee, with instructions to take the necessary steps and report progress at the next Association Meeting.

The *Secretary* reports that an important case had recently been decided in the Kuala Selangor Court, viz: whether "Crimping included incitement to give a month's notice." The Magistrate had decided that it did, and the Kuala Selangor Association was anxious to have the help of the P. A. M. legal advisers, should an appeal be lodged. This had so far not yet been done, but he had obtained a fiat from the Deputy Public Prosecutor for Messrs. Drew and Napier to conduct this case on appeal.

Resolved to engage Messrs. Drew and Napier, should the case go to the Court of Appeal.

6. Corporations Duty Enactment.

Mr. *Macfadyen* reports on the action taken by himself and the Hon. Mr. Skinner in the Federal Council which had resulted in an amendment of this Enactment having the effect of exempting the Planters' Benevolent Fund from any payment under it, in respect of grants made to planters, who had been in the Malay Peninsula for at least three years, or to any dependents of theirs.

7. Outside Employment on Holidays.

The *Secretary* reads the following correspondence:—

"Kuala Lumpur, 23rd October, 1914."

"Messrs. Drew and Napier,
Kuala Lumpur."

"Dear Sirs,

Reverting to your favour of the 1st of September on the Outside Employment of Estate Labourers on Sundays, I am directed to inform you that this Association proposes to press for an amendment of the Labour Code, making such employment of coolies on their weekly day of rest by others than their permanent employers illegal; and I shall be glad to receive from you suggestions regarding the form such an amendment should in your opinion take."

"Believe me, etc.,
(Sgd.) H. C. E. Zacharias,
Secretary."

"Kuala Lumpur, 16th November, 1914."

"Drew and Napier"
"Advocates and Solicitors."

"Dear Sir,

PLANTERS' ASSOCIATION OF MALAYA.

re Suggested Amendment to Labour Code as to Employment on Holidays.

We duly received your letter of the 23rd ultimo. requesting us to suggest the form that an amendment of the Labour Code 1912 should take for the purpose of prohibiting the employment, except by their regular employers, of labourers on Sundays and other days upon which labourers are not bound to work for their regular employers, and we now enclose the draft Section which we trust will meet the requirements of the Association.

We suggest that the new section should come in after Section 99 and be numbered 99A.

"Yours faithfully,
(Sgd.) Drew and Napier."

Secretary, Planters' Association of Malaya,

(i). "No labourer who shall under this Enactment be bound by an agreement or contract with an employer for a period exceeding one week shall, during the continuance of such agreement or contract, work for any person other than such employer upon any day upon which the labourer shall not be bound to work for the said employer or upon any day upon which he shall be entitled to absent himself from work for the said employer or upon any holiday and no person other than such employer shall employ any such labourer upon any of such days or holidays as aforesaid."

(ii). "Any labourer acting in contravention of the provisions of sub-section (i) of this Section shall be liable on conviction to a fine not exceeding $ and any person employing a labourer in contravention of the provisions of sub-section (i) of this Section shall be liable on conviction to a fine not exceeding $ ."

Resolved, on the motion of Mr. Farquharson, seconded by Mr. Ritchie that the Amendment, as drafted by Messrs. Drew and Napier, be submitted for incorporation in the Labour Code; suggesting as fines $1 and $5 respectively.

8. Export Duty.

The *Secretary* reads the following letters:—

"Kuala Lumpur, 20th October, 1914."

"Ag. Commissioner of Trade & Customs, F. M. S.,
Kuala Lumpur."

"Sir,

I have the honour to acknowledge receipt of your letter 25/690, which was considered at a Meeting of my Association held on the 18th inst.

This meeting, while welcoming the application to the rubber export duty of the principle of a sliding scale, have instructed me to enter on behalf of the Association a strong protest against the basis of assessing values, since the scale was brought into force.'"

"I have, etc.,
(Sgd.) H. C. E. Zacharias,
Secretary."

"Johore Planters' Association.

20th December, 1914."

"The Secretary,
Planters' Association of Malaya,

"Dear Sir,

I beg to inform you that at an Extra-ordinary General Meeting of this Association held on Sunday the 6th inst. the following resolution was passed:—

> "That as the present levy of duty is extremely onerous more especially on the lower grades of rubber, it is advisable that Government should be approached with a view to obtaining relief."

The Committee suggested that the rate for assessment be arrived at by means of an average value between the prices of the highest and lowest grades of rubber;—that is to say, that in 100 lbs. of rubber, 75 lbs. should be taken as of the highest class and 25 lbs. as of the lowest, that the average London price be taken as standard and 4*d* per lb. be deducted for charges and for the labour expended in preparing rubber for the London market. This price was to be taken in connection with the present sliding scale, and values calculated accordingly.

I am instructed to ask you to lay this scheme before your Committee and ask if they will give it their support."

"I am, etc.,
(Sgd.) H. H. Ramsay,
Hon. Secretary."

Mr. *Macfadyen* considers that, interesting as the Johore scheme was, it would by far be the strongest line to take, to insist that 'ad valorem' should correspond with the actual value of rubber at the time of export and at the port of export. Nothing was easier than to obtain the total weight of rubber sold at Singapore auction and to divide this into the total price paid, the result being, not a fancy figure, but the actual average value of a pound of rubber at Singapore at the time. It was commonsense to take this figure and to pay export duty on this value, until the next auction was held; and he was afraid they would only weaken their case, if they now adopted themselves a system, as artificial as the present Government basis.

He might mention that since the last meeting he had, through the courtesy of Messrs. Guthrie and Co., been provided with a complete list of all rubber sold by auction in Singapore, and it

appeared that since a fortnight after war broke out (during that fortnight they paid no duty) they had been paying about 3¾ per cent 'ad valorem', assuming the Singapore price was the value of rubber here.

He was now obtaining similar figures for sales effected in London during that period, and he quite expected to find that they had been overcharged even on the basis of the London Sales' prices.

He would add that it had been hoped that one of those estates in Perak whose titles expressly provided that they would be charged 2½ per cent 'ad valorem' would bring a test case, as to what "value" meant; but unfortunately none had so far been willing to bring such an action against the Government.

Mr. *Milne* thoroughly agrees with what Mr. Macfadyen had said and deprecates any such guess work as suggested by Johore. Nothing was easier than to get at the actual value, and they should hold out for nothing less or more than that.

Mr. *Maude* understands that Kedah estates pay their duty on the value of the Penang auctions.

Mr. *Farquharson* strongly urges not to confuse the issue by starting on a new line altogether, and proposes that the Standing Committee be instructed to approach the Government again on the subject.

Mr. *Milne* seconds this motion, which is carried unanimously.

## 9. Currency.

Mr. *Leggatt* explains, before going further with this subject of Currency which his Association had asked him to bring forward, that the subject had nothing whatever to do with the rate at which the dollar is fixed, but merely to advocate the use amongst the labouring classes of coins lower than the present 1 cent piece, and to ask them to pass a resolution which will make this possible.

Enactment No: 8 State of Selangor 1907 which saw the introduction of the fixed rate of the dollar, enacted also that amongst lower coins ½ and ¼ cent pieces were to be issued, and for the present he only proposed that they shall ask for an issue of these coins, so that their lowest coin should be the ¼ cent piece.

This is a request that Government will find it easy to accede to as it is merely asking them to put in force in full their enactment already passed.

Mr. Leggatt then moved the following resolution:—

> "That the Government be requested to make an immediate issue of ½ and ¼ cent coins, the amount to be decided by the Committee of this Association."

And "That District Associations affiliated to the P. A. M. be asked to circularise their members, requesting them to obtain and pay out to their coolies on Pay Day a certain limited number of these coins, and further to see that the Shopkeepers in their District accept them as Legal Tender."

Mr. *McCulloch* says he was responsible for mooting this question first of all, but he had only spoken as a private member and not for the Committee of his Association, whose views he had not ascertained. He quite agreed with all Mr. Leggatt had said and as a further illustration pointed to the fact that in China a coin representing 10 cents locally, bore the inscription "72 candareens."

Mr. *Carter* rather doubts the cogency of the arguments adduced. From personal experience he could say that many Estates refused even to pay out one cent pieces and made up wages to the nearest 5 cents.

Mr. *Jeavons* supports the case put forward by Mr. Leggatt and suggests, before further action is taken, that District Associations be circularised on the subject and information obtained from them as to how many extra ½ and ¼ cent coins were in their opinion required and could be put in circulation.

Mr. *Carter* seconds this proposal, which is carried.

10. Fatal Accidents.

Mr. *E. W. Harvey* recommends that the P. A. M. initiate an enactment to meet the anomaly of law which allowed injured persons to claim but prohibited any claim by dependents in the case of such injury leading to the death of such person.

He proposes that the Government be approached accordingly.

Mr. *Cumming* seconds this proposal, which is carried unanimously.

11. Dressers on Estates.

The *Secretary* reports the receipt of the following letters:—

"Office of the Principal Medical Officer"

"Federated Malay States."

"No: 8 in 85/1913."

"Kuala Lumpur, 24th October, 1914."

"EXAMINATION FOR DRESSERS ON ESTATES."

A Register of Estate Dressers to be kept by P. M. O.

"Sir,

In reply to the questions put to me at a recent meeting of your Association, I have the honour to make the following suggestions:—

(1). A Register of Estate Dressers to be kept by my department—this Register will contain the names of those who come up for examination—will be open to inspection by any Estate Manager or person duly authorised by him. Information regarding any dresser whose name is on the register will be supplied on application but it is not proposed to issue any certificates.

(2). Examinations of Government Dressers are held twice a year in June and December—in Taiping and Kuala Lumpur alternatively—the names of those who wish to enter for these examinations must be sent to my office at least one month beforehand.

(3). The examinations are divided into three sections and the dressers are graded accordingly. In order to pass the 3rd grade examination an applicant should possess the VII standard School Certificate and have been attached to an estate hospital for at least 2 years, producing a certificate from the estate doctor to that effect, and pay a fee of $10. To enter the second grade the applicant must produce a certificate from the estate doctor to the effect that he has served five years and pay a fee of $15. To enter for the first grade the applicant must produce a certificate from the estate doctor to say he has served thirteen years and pay a fee of $25.

It is proposed to attach the following information against the name of every dresser enrolled in the Register. (1) Name (2) Age (3) Nationality (4) Date of Appointment (5) where employed (6) Dates of Examination (7) Results."

"I have, etc.,
(Sgd.) Charles Lane Sansom,
Principal Medical Officer, F. M. S."

"The Secretary,
Planters' Association of Malaya,
"Office of Principal Medical Officer, F. M. S."
"No: 12 in 85/1913."
"Kuala Lumpur, 17th December, 1914."

"Sir,

I have the honour to inform you that there are at present 10 Student Hospital Assistants who are being trained at Government Expense at the Medical School, Singapore, and who are due to pass their examination about April 1915, the services of these Hospital Assistants will be available from that date and I am to enquire if any Estates require the services of these men, they should start on a salary of $60 rising by annual increment of $10 to $120 per mensem."

"I have, etc.,
(Sgd.) Charles Lane Sansom,
Principal Medical Officer, F. M. S."

"The Secretary,

Planters' Association of Malaya,

Resolved to thank the P. M. O. for his proposal re register and to inform him that this scheme meets entirely the wishes of this Association.

As regards the ten Student Hospital Assistants, the Secretary is instructed to circularize constituent Associations accordingly.

12. Date of Meetings.

Mr. *E. W. Harvey* demurs to meetings being held on a Sunday, which was quite the most inconvenient day. Saturday would be a very much more suitable day.

Mr. *Jeavons* reminds members that he had made a similar protest some time ago, but had not received much support.

Resolved that the matter be placed on the agenda of the next Meeting.

13. General.

The *Secretary* tables

(1) letter from Commissioner of Trade and Customs re Export of Rubber to France and Vladivostok.

(2) letter from Commissioner of Trade and Customs re Siddall's lime juice machinery.

(3) letter from Borneo Co. Ltd. re "Dynamite in Rubber Plantations."

The Meeting terminates at 1 p.m.

H. C. E. Zacharias,

*Secretary.*

## FEDERATED MALAY STATES.

*Comparative Statement of Cultivated Rubber Exported, with Value and Duty Collected Thereon, During the Years 1914 and 1913.*

| Destination. | Exported during November, 1914. | Previously. | Total export during the year. | Export during similar period of previous year. | Increase. | Decrease. | Value of rubber exported, 1914. | Duty collected, 1914, to date. |
|---|---|---|---|---|---|---|---|---|
| | Tons. | Tons. | Tons. | Tons. | Tons. | Tons. | $ | $ c. |
| Straits Settlements ... | 1,652.03 | 14,398.43 | 16,050.46 | 9,714.69 | 6,335.77 | ... | 26,094,084 | |
| United Kingdom ... | 1,190,33 | 8,556.48 | 9,746.81 | 9,367.42 | 379.39 | ... | 19,219,996 | |
| Continent of Europe... | ... | 807.78 | 807.78 | 1,220.37 | ... | 412.59 | 1,439,762 | |
| Ceylon ... ... | 46.69 | 584.20 | 630.89 | 547.55 | 83.34 | ... | 914,595 | |
| Other Countries ... | ... | 100.27 | 100.27 | ... | 100.27 | ... | 413,498 | |
| Total ... | 2,889.05 | 24,447.16 | 27,336.21 | 20,850.03 | 6,898.77 | 412.59 | 48,081,935 | 1,151,434 64 |

KUALA LUMPUR,
*7th December, 1914.*

H. W. FIRMSTONE,
*Acting Commissioner, Trade and Customs, F.M.S.*

*Abstract of Meteorological Readings in the various Districts of Malaya for the Month of November, 1914.*

| DISTRICT. | Mean Barometrical Pressure at 32° Fah. | Maximum in Sun. | TEMPERATURE. | | | | HYGROMETER. | | | | Prevailing Direction of Winds. | Total Rainfall. | Greatest Rainfall during 24 hours. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mean Dry Bulb. | Maximum. | Minimum. | Range | Mean Wet Bulb. | Vapour Tension. | Dew Point. | Humidity. | | | |
| Kelantan, Kota Bahru | ... | 149. | 80.5 | 87.83 | 74.16 | 13.66 | 77.6 | .885 | 75.6 | 85% | ... | 13.55 | 4.25 |
| Malacca, Durian Duan Hos. | 29.790 | 153.7 | 83.9 | 88.7 | 72. | 16.7 | 79.5 | .964 | ... | 84 | N. | 10.69 | 1.84 |
| N. Sembilan, Dist. Hospital Seremban | ... | 149.3 | 78.8 | 87.2 | 71.8 | 15.4 | 75.9 | .841 | 73.9 | 84 | N.W. | 9.18 | 1.48 |
| ,, Dist. Hos. K. Pilah | ... | ... | 81.0 | 89.4 | 73.2 | 16.2 | 77.7 | .889 | 75.5 | 83 | ... | 5.52 | 1 82 |
| ,, ,, Tampin | ... | 144.5 | 80.9 | 90.6 | 75.2 | 17.4 | 76.8 | .841 | 73.9 | 79 | ... | 13.18 | 2.36 |
| ,, ,, P. Dickson | ... | ... | 81.6 | 87.3 | 75.8 | 13.5 | 77.4 | .857 | 74.5 | 79 | ... | 10.26 | 2.35 |
| Pahang, ,, K. Lipis | ... | ... | 81.0 | 89.2 | 71.3 | 17.9 | 76.2 | ... | ... | ... | ... | 7.59 | 2.75 |
| Penang, ,, Penang | 29.816 | 141.9 | 82.3 | 88.6 | 73.2 | ... | 77.6 | .874 | 74.9 | 81 | ... | 11.31 | 4.10 |
| Perak, ,, Taiping | ... | ... | 81.09 | 92. | 68. | 24. | 76.82 | .867 | ... | 82 | ... | 37.12 | 4.93 |
| ,, ,, Ipoh | ... | ... | 81.98 | 92. | 70. | 22. | 76.90 | .858 | ... | 78 | ... | 15.89 | 2.48 |
| ,, ,, T. Anson | ... | ... | 81.93 | 92. | 70. | 22. | 77.52 | .886 | ... | 83 | ... | 21.97 | 3.15 |
| ,, ,, P. Buntar | ... | ... | 81.75 | 91. | 71. | 20. | 77.39 | .875 | ... | 83 | ... | 13.14 | 2.13 |
| ,, The Cottage | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | 34.27 | 5.00 |
| Selangor, General Hospital, Kuala Lumpur | ... | 145.5 | 80.1 | 88.8 | ... | ... | 77.0 | .868 | 74.9 | 84 | N.E. | 17.03 | 2.05 |
| ,, Dist. Hos. Klang | ... | ... | 80.4 | 87.9 | 73.3 | 14.6 | 78.8 | ... | ... | ... | ... | 12.47 | 2.27 |
| ,, ,, K. Selangor | ... | ... | ... | 87.5 | 75.1 | 12.4 | ... | ... | ... | ... | ... | 9.97 | 3.58 |
| ,, ,, Rawang | ... | ... | ... | 92.0 | 71.9 | 20.1 | ... | ... | ... | ... | ... | 11.42 | 2.74 |
| Singapore, Kandang Kerbau Observatory | 29.809 | 162.2 | 82.8 | 89.0 | 74.7 | 14.3 | 77.9 | .885 | ... | 79 | ... | 6.93 | 1.93 |